

REMARKS

CLAIM REJECTIONS – 35 USC§ 103

The applicant respectfully traverses the arguments of the examiner as follows:

Claims 1-9 have been rejected as obvious over either WO ‘638 or WO ‘660. As can be seen from the PCT applications of the two cited references, as well as the PCT application in the current application, the applicant for all three inventions is Wood Polymer Technologies ASA. In as much as the three inventions represent different but related compositions and methods for impregnating wood, it may be helpful for a full understanding of the current invention to refer to the various compositions/methods by the three “catchwords” used by the applicant for these inventions.

The three inventions are commonly referred to as “Black” (WO ‘638), “Lite Brown” (WO ‘660) and “Brown II” (current application) as seen in the table below. The catchwords reflect one of the properties of the various compositions, namely the coloration of the wood products achieved after impregnation, allowing for the imitation of various noble, darker-colored wood species.

Patent catch word	Key invention	Initiator	Solvent / Diluent	Stabiliser
Black WO - 638	Wood impregnated with polymerizable furfuryl alcohol monomer solution. Compared to prior art the novelty is in the choice of initiator, making homogeneous treatment of relatively large wood dimensions feasible with a single step in the impregnation part of the process. Another essential element of the invention is that the right choice of initiator gives a solution with a long storage life; the initiator does not start reacting until heat is supplied to the system.	anhydrides or free acid forms of the dicarboxylic acids malic acid, phthalic acid and/or maleic acid. Such initiators will not separate from the FA monomer during penetration through the wood, an important advantage over prior art.	None	None

Patent catch word	Key invention	Initiator	Solvent / Diluent	Stabiliser
Lite Brown WO -660	<p>Furan polymer impregnated wood. The novelty over prior art, incl. "Black", is the use of water as a diluent, allowing control of chemical concentration in the wood.</p> <p>Another crucial element of this invention is the stabilisers, used for controlling acidity and thus the action of the initiator(s) during the condensation polymerisation reaction.</p> <p>Stabilizers also control the homogeneity and storage life of the claimed impregnation solutions.</p>	As in "Black"	Water	Borax, (sodium hydroxide), and salts of lignosulfonic acids.
Brown II	<p>Furan polymer impregnated wood. The key novelty here is the use of low boiling alcohols or acetone as stabilising co-solvents <u>instead</u> of the stabilisers claimed in "Lite Brown".</p> <p>The co-solvents inhibit the acidity, probably by slowing down the hydrolysis of anhydrides. Removal of the co-solvent in a specific step prior to curing is another element of the invention. Once the co-solvent is removed, the pH decreases and the polymerisation starts.</p>	Maleic anhydride, phthalic anhydride, maleic acid, malic acid, phthalic acid, benzoic acid, citric acid, zinc chloride, aluminium chloride, other cyclic anhydrides and acids and combinations thereof.	Water and co-solvent selected from acetone or low boiling alcohol such as methanol, ethanol, isopropanol or combinations thereof.	None

As described in the table above, the "Black" composition/method of '638 relates to a furan polymer impregnated wood, wherein the composition comprises furfuryl alcohol (FA) initiated with a weak acid. As more fully discussed in the reference, the initiated FA composition allows a homogeneous treatment of wood products in a single step, in which the initiated FA penetrates uniformly through the wood. The catchword "Black" is an appropriate description of the end product since the initiated FA is highly

concentrated, resulting in a dark coloration of the wood. Contrary to the assertion of the examiner, the “Black” composition does not provide nor teach the use of a stabilizer nor a diluent.

As discussed in WO ‘660, the “Lite Brown” composition/method provides for a treating solution that is significantly diluted compared to the “Black” treating formulation. The advantages of this composition include, *inter alia*, the ability to use significantly less chemical in the treating formulation and longer storage life of the formulation. The diluted composition also results in a lighter coloration of the finished product, hence the catchword “Lite Brown”. WO ‘660 discloses that water is a very desirable diluent, but that initiated FA does not mix well with water. Combining initiated FA with water results in a formulation that separates into two components that cannot be uniformly impregnated into the wood. WO ‘660 overcomes this problem by providing specific stabilizers that make the diluted catalyzed mixture stable enough to use commercially. They do it by controlling pH (buffering), keeping it high when in storage and lowering it during curing. In this respect, the examiner is correct that “Lite Brown” does indeed teach the use of specific stabilizers.

Brown II (the current application) on the other hand, does not provide for the use of added stabilizers. Brown II is an improvement over Lite Brown, achieving the advantages that Lite Brown has over Black, but by the non-obvious difference of using a low bp co-solvent INSTEAD of a separate stabilizer, with the advantages described in the application, e.g., the ability to decrease the pH of the formulation by evaporation of the low bp co-solvent after the formulation has penetrated the wood, which starts the polymerization process, avoiding the need for added chemical stabilizers, etc.

Because ‘660 teaches the use of added stabilizers, it is argued that it would not have been obvious to one skilled in the art to eliminate precisely those stabilizers to achieve a similar result by a different chemical process. It is well settled that the motivation to arrive at a claimed combination must be found in the prior art references, and here it is respectfully submitted that such motivation is lacking since one must disregard the teachings of ‘660 to arrive at the present invention.

The co-solvent disclosed in the present invention is a chemical that mixes with the FA in the solution, making the FA more permanently soluble in water. It is a co-solvent, with water, of FA, its esters (with MA) and its oligomers (partially reacted molecules). It causes many of the same effects as in Lite Brown

(longer solution life, pH lowering upon solvent evaporation), but for different reasons and with distinct advantages.

Regarding claim 3, it is respectfully submitted that neither '638 nor '660 suggest starting the curing process by a co-solvent removal step, in as much as neither reference discloses a low bp co-solvent.

Regarding claim 4, the use of a low bp co-solvent allows for the use of room temperature to initiate the curing process (the low bp co-solvent will evaporate at room temperature, thus lowering the pH and starting the curing), which is not achievable with nor suggested by the stabilizers disclosed in '660.

Claims 5-8 depend from claim 2, which as argued above is believed to be patentable over '638 and '660.

CLAIM REJECTION – 35 USC §112

Claim 9 has been cancelled.